

## SEQUENCE LISTING

SEQ ID NO: 1: Nucleotide sequence of 11.5 kb PCR product amplified from chromosomal DNA of *C. jejuni* OH4384 which includes *LOS* biosynthesis locus

1 aagaatacg aatttgctaa agaggctta aatcttagtg gtattgatga aacacatata  
61 gaatttagcgc caaaaattaa tcttgaagag ctaatggctt ttacaaaat gatggatctt  
121 atcatagcaa atgatagcgg tccaaacat tttagtttg cttttaataa agcatctatt  
181 acgattttg gtgcaaacacc aagtcaccg aatgttttc aactcataat caataaaatc  
241 attgatacag gtaaaaaaaat ccaaaatgcc aagcatatcg ataaaagtga ttttgatc  
301 acgcgtatag aagaagaaga tatcttcaa cttgccaag gcttacttaa tgaaaaatag  
361 tgatagaata tatcttagt tttttatatt ttgaaattt ttgttactt ttatgcctga  
421 ttttatcttgc catttttag cttagtgc aatcttgc aatctgtttt cctcaatataa  
481 acaccgaaa atcatcaata caaaaatttgc aatcttgc aatcttgc aatcttgc  
541 acgcgataaa ttgtctttaa aaattttatga aaattttgtct cttcaataaa  
601 gcaaaatcaa aacaccacca aaaaaaaaat tctcaataaa gtaaatttca tcaatgaaaa  
661 ttttcttata gatqcccctgg cttaaaggc tccttattatc ttccaaactg cacaatgg  
721 aaactggaa attttaaggc ttgtttatgc ggcttaatat ggtgcattt ccatagtggtt  
781 aaaaaaggta aaaaatgtaaat ttatgtatga aatttaaggc caaagtgcac cccaaatttga  
841 catagaactt attgacaaaaa aaggcggtat aagacaatg ctaagtgtctc taaaaaggaa  
901 gagagcttg ggaattttaa ctgtatcaaga aacgaaaaggc taagataaaa  
961 atttttaac aaagaatgtaa attatcaaat gggagcaagg cttagcgcac aaaaaggca  
1021 tgctttgatc atccctgttt atgcctataa aaaaatgtttt aaattttgca tagatttt  
1081 taaagcaaaa gatttctaaa atgcaatgtttt aaaaatgtttt aaaaatgtttt  
1141 ttgcgaagaa atgattaaaaaa aagacccctgg gaaatactttt aaaaatgtttt  
1201 tagttataat gaggaaattt acaagggtgc aaaaatgtttt aaaaatgtttt  
1261 atcatcgtaa aaaatgtcg gcaaaactttg cttaggtttt taaaatcttt  
1321 gatgaaatata ttttacttaa caatgaaaatg agcgataataa ccctaaaaat  
1381 tttaaaaaaaat ttttgtctaa ttatataattt tttttatagg ttttggagct  
1441 ttaaaaaatc ttgttttaag ttatgtggaa aatgtggaa ttatgtgtat  
1501 gaaatgtcttg aaaaatgtgg tattaaaggag cttaaaaatt taaaacttca  
1561 atcatcgcac ttgcgcac aaatctctat aaatctctat ggataaaaggc atgtgggtgg

## SEQ ID NO: 1 (cont'd)

1621 tggcctgatt atgttttag aatttttaat aaaaatttca ctgcgtttaa tgataattta  
 1681 gtacatggaa gccttggttt gccaaatgtt gctaaaaaaa tttatcttaa aatggatg  
 1741 aagcattatt cttataaggaa tatcttcac ttaattgaca aaatgcgagta ctaactcaagt  
 1801 ctttggcaa aacaaaat acacaaaaaa agtgggtgtt taaaaggcaa. tttaagagct  
 1861 tttggactt tttttagaa ttatttta aaaaatggct tttttatatgg ttataagggt  
 1921 ttataattta gcgtttggc tgcattggg acattttta aatataatgaa attatatgaa  
 1981 cttcaaggac aaaaaccaa aacttgcgt ttaataataa taacttataa taaaaaaggaa  
 2041 cgccttaaac tagtgcgtga tagtgttaaa aatctggcct tttaacccaa tgaagttta  
 2101 atcgcgatg atggtagcaa agaaataca gcaaggctta ttgaagaata taaaaaagat  
 2161 tttccttgc ctttaaaaca catttggcaa gaagatgaaag ggtttaaact tagtaaaagt  
 2221 cgaacaaaaa ctataaaaaa cgctgtatgt gaatataaa tagttatgtg tggatata  
 2281 attttggaaa aaggatttcat aaaaagacat ttagatttg cacaaggaaa gttttttta  
 2341 caaggttcaa ggttaattt aaataaaaaa gaaaggcaag aaaaaattttaa caaagatgt  
 2401 tatcgctaa ttatcataa aaaaagattt aaaaatttctta aaaaatttctta tttagctaa  
 2461 atatttaca gtccttcaaa aaaaagatga aaaaatcttt taaaaaaccctcttattaa  
 2521 agtatttagg ggttgcataa tgagggtttt tttatgtgtt ttgtatgggtt  
 2581 taatggaaat ttatgggtt ggggttagaga agatagtggaa ttgttgtctaa gatttttatt  
 2641 taataaggc atttttagac gattaaaatt taaaggctt gcttacata ttatcaca  
 2701 agaaaaatggc aaaaaatgc ttgaaagcaa tcatcaatt tatttagata ccatcaaaa  
 2761 taaaaaaggatt tccttggagat aaaaacatggaa gaaaatagggt gtagttatac caatctataa  
 2821 tggtagaaaaa tatttaaggaa aatgtttaga tagcgttatac aatcaaactt atactaactt  
 2881 agaaaatataa ctgtcaatg atggtagcac agatggacac tcactcaata ttgcaaaaaga  
 2941 atatacccta aaagataaaa gaataactt ttttggataag aaaaatgggg gttaagttc  
 3001 agctagaaat ataggatataa aataactttat cggggaaat aaaaaaaa acaaaactca  
 3061 acatataaaa gaaaaattttt taatagaatt tcaatggat ggtataatac ctataatat  
 3121 atataaagca tataaaaggct tcaagcttt taataatgaa aaaaatttaa ccaattttac  
 3181 ttacccatgtt atagattata ttatattttt agatagtgt aattatttggaa aactaaactg  
 3241 catagaagaa tgcggttataa gaatggaaaaa ttgtggatgtt tggtgttgg accatgatgt  
 3301 cacctatggaa gacaatataa aaaaataagca caaaaaaaaca aggtggaaa tttttgat  
 3361 taaaaaggaa tttataatca ctccaaaaaaa atatgaaat cggcattaa gtttaggtt aatttttaa  
 3421 tagagatatt tctttttggat ggaatggaaat gattgatttt aaaaaattttt aaaaaattttt  
 3481 acttaatattt ataaaattttt tttatcaatgtt agatatacac ttggatataa ttgtttttgc

SEQ ID NO: 1 (cont'd)

SEQ ID NO: 1 (cont'd)

SEQ ID NO: 1 (cont'd)

## SEQ ID NO: 1 (cont'd)

9301 aatactacaa gcgataaaagt gctttacat gctctaaaat ttatcaaaga ttatcaaaga  
 9361 gtagttttt tacaacccac ttccggcgtca agaacaataa ttcataatgtga tgaggcttt  
 9421 aatctttata aaaatagcaa tgcaaatgcc ctaattagcg taaatgtgaa  
 9481 attctaaaag cctttgttgc taatgtaaaat ggcgatttag caggatgtg taatgtgaa  
 9541 tattccttttgc caaggaaaaa aaaattggct aaaacatata tggcaatgg tggcaatttt  
 9601 attttaaaaga taatgtaaaat tttaaacaat cctagcttt tacaagaa aaccaaggcat  
 9661 tttttaatgg atgaaagctc aagttagat attgactgtt tggaggattt aaaaaggct  
 9721 gaacagatgtt gaaaaaaaata acctaaaaat gcaataaaaaa tataataaaat ttatcaaagg  
 9781 aatataatatttataaaaaa actttatatacg aaaaatccgt aagatttca agactaaaaa  
 9841 ccaaagattt tataacccctt ccattggaaa acaatcaact agagatgtta gccccggctgg  
 9901 ggatagaaga atattgtgt tttaaattta gcaatatctt acatgaaatgtt gattcattt  
 9961 cttttagcggtt atctttttca ccttcaattata caaaaggttgg aaggatgtt tcaattttcg  
 10021 atgggtttc tatgttttaac ttcaaacatc ctatggatag aatcagcact gcaagttttta  
 10081 cctatgaaac aaatcatatgt ttatattaacg atgcttgcca aaatcacatc aacaaaaacat  
 10141 ttccctatagt taaccataat ccaagctcat caataacgca tttaattata caagatgtatg  
 10201 ttggatagg aaaagatgtt ttgtttaaacc agggatcac acttggact ggtatgttca  
 10261 taggacaaag agctgtatgtt acttaaagatgtt taccacctta tgctatagtt gcaggaaattc  
 10321 cagccaaaat tatcaaaat agatttgtatg aaaaacaat agaaagatgtt taaaatttc  
 10381 aatgggtggaa atatcattt gctgatgtt atgatattgtatgatattttttaaaaatccaa  
 10441 aatatcttgc cctactagaa gaaaaaatca taaaatccaa aatttcctac tataatccaa  
 10501 ataaacttta tttagatgtt attttagaaac taaaatccaa aaaaattttt atatctttt  
 10561 aatctttt tccccctgc ttctctctc tttaaaactt caaaatattt ctgtgaaat  
 10621 tcatactgtg caaactctt ggatgtttt ttatgtatgtt cattatctt cttttatca  
 10681 tgataattttt gatttaaaaat ttctttttcat atcttcattt tgatattaaat  
 10741 tcataatgtt aatgtcaagt tttaaaaaaca gctattttttccatccat cacaatccat aaaaatccat  
 10801 taacaaaaaa gcacatctc gccataattt aacgcctcat ctatttat ttttccaaaa  
 10861 cttttaaaga tgatatctt tttaaaggcactt ccggcccaaa ccgaccagca aaaaatgcctt  
 10921 tgtttgctta aaaaattctaa aatttcctt tgataaaaaa cttcatcttg tttaaaacgca  
 10981 taaaatgtttt tggtttttac cctatgcaca aaggcatca aacaaggcaa ataaaaacccct  
 11041 tttttcatctt ttttaaagc tatttcacaa gcatcagggtt taaaatccatc atcactatct  
 11101 aaaaacattttttt aaaaatccatc aatgtcaatgc aaaaacccca aatttcatttact tgccaaaaatgt  
 11161 cttcaattttt cttcattttt aatgtttt attcttgc aatatttttttgc aatatttttttgc

SEQ ID NO: 1 (cont'd)

11221 accatattta aactattatc ttactttta tcatcgataa tc当地atcc aatatcttt  
11281 aaagtctgat ttatacaact ttgcaaaagct ttggagataa aatcgcaaga attaaaaagg  
11341 gggatttatga tagaaaggttg tggcatattt ttccattttaattt ttgttaaaat aataaaaaaca  
11401 attctatcaa agtttaggaa atttatgaaa attttatac accttccaaac ctggtttaggc  
11461 gatacggtaa tggc

SEQ ID NO: 2: Nucleotide sequence that encodes bifunctional sialyltransferase *cstII* from *C. jejuni* strain OH4384 (ORF 7a of *LOS* biosynthesis locus)

ATGAAAAAAAG	TTATTATTGC	TGGAAATGGA	CCAAGTTAA	AAGAAATTGA	50
TTATTCAAGA	CTACCAAATG	ATTTGATGT	ATTTAGATGT	AATCAATTTC	100
ATTTTGAAGA	TAAATACTAT	CTTGGTAAAAA	AATGCAAGGC	AGTATTTCAC	150
AATCCTATTG	TTTTTTTGA	ACAATACTAC	ACTTTAAAAC	ATTTAATCCA	200
AAATCAAGAA	TATGAGACCG	AACTAATTAT	GTGTTCTAAT	TACAACCAAG	250
CTCATCTAGA	AAATGAAAAT	TTTGTAAAAA	CTTTTACGA	TTATTTTCCT	300
GATGCTCATT	TGGGATATGA	TTTTTCAAA	CAACTTAAAG	ATTTTAATGC	350
TTATTTTAAA	TTTCACGAAA	TTTATTCAA	TCAAAGAATT	ACCTCAGGGG	400
TTTATATGTG	TGCAGTAGCC	ATAGCCCTAG	GATACAAAGA	AATTTATCTT	450
TCGGGAATTG	ATTTTATCA	AAATGGGTCA	TCTTATGCTT	TTGATACTAA	500
ACAAAAAAAT	CTTTTAAAAT	TGGCTCCTAA	TTTTAAAAT	GATAATTAC	550
ACTATATCGG	ACATAGTAAA	AATACAGATA	AAAAGCTT	AGAATTCTA	600
GAAAAAAACTT	ACAAAATAAA	ACTATATTGC	TTATGTCTA	ACAGTCCTT	650
AGCAAATTTC	ATAGAACTAG	CGCCAAATT	AAATTCAAAT	TTTATCATA	700
AAGAAAAAAA	TAAC TAC ACT	AAAGATATAC	TCATACCTC	TAGTGAGGCT	750
TATGGAAAAT	TTTCAAAAAA	TATTAATTTC	AAAAAAATAA	AAATTAAAGA	800
AAATATTAT	TACAAGTTGA	TAAGAGATCT	ATTAAGATTA	CCTAGTGATA	850
TAAAGCATT	TTTCAAAGGA	AAATAA			876

SEQ ID NO: 3: Amino acid sequence of bifunctional sialyltransferase *CstII* from *C. jejuni* strain OH4384 (encoded by ORF 7a of *LOS* biosynthesis locus)

1	MKKVIIAGNG	PSLKEIDYSR	LPNDFDVFR	NQFYFEDKYY	LGKKCKAVFY	50
51	NPILFFEQYY	TLKHLIQNQE	YETELIMCSN	YNQAHLENEN	FVKTFYDYFP	
101	DAHLGYDFFK	QLKDFNAYFK	FHEIYFNQRI	TSGVYMCABA	IALGYKEIYL	
151	SGIDFYQNGS	SYAFDTKQKN	LLKLAPNFKN	DNSHYIGHSK	NTDIKALEFL	
201	EKTYKIKLYC	LCPNSLLANF	IELAPNLNSN	FIIQEKNNYT	KDILIPSSEA	
251	YGKFSKNINF	KKIKIKENIY	YKLKDLLRL	PSDIKHYFKG	K	

SEQ ID NO: 4. Nucleotide sequence of bifunctional sialyltransferase-encoding *cstII* (ORF7a) from *LOS* biosynthesis locus of *C. jejuni* serotype O:10

ATGAAAAAAAG	TTATTATTGC	TGGAAATGGA	CCAAGTTAA	AAGAAATTGA	50
TTATTCAAGG	CTACCAAATG	ATTTGATGT	ATTTAGATGC	AATCAATTTC	100
ATTTTGAAGA	TAAATACTAT	CTTGGTAAAAA	AATTCAAAGC	AGTATTTCAC	150
AATCCTGGTC	TTTTTTTGA	ACAATACTAC	ACTTTAAAAC	ATTTAATCCA	200
AAATCAAGAA	TATGAGACCG	AACTAATTAT	GTGTTCTAAT	TACAACCAAG	250
CTCATCTAGA	AAATGAAAAT	TTTGTAAAAA	CTTTTACGA	TTATTTTCCT	300
GATGCTCATT	TGGGATATGA	TTTTTTAAA	CAACTTAAAG	AATTTAATGC	350
TTATTTTAAA	TTTCACGAAA	TTTATCTAA	TCAAAGAATT	ACCTCAGGAG	400
TCTATATGTG	TGCAGTAGCT	ATAGCCCTAG	GATACAAAGA	AATTTATCTT	450
TCTGGAATTG	ATTTTATCA	AAATGGGTCA	TCTTATGCTT	TTGATAACCA	500
ACAAGAAAAT	CTTTTAAAAC	TGGCTCCTGA	TTTTAAAAT	GATCGCTCAC	550
ACTATATCGG	ACATAGTAAA	AATACAGATA	AAAAGCTT	AGAATTCTA	600
GAAAAAAACTT	ACAAAATAAA	ACTATATTGC	TTATGTCTA	ACAGTCCTT	650
AGCAAATTTC	ATAGAACTAG	CGCCAAATT	AAATTCAAAT	TTTATCATA	700
AAGAAAAAAA	TAAC TAC ACT	AAAGATATAC	TCATACCTC	TAGTGAGGCT	750

TATGGAAAAT	TTTCAAAAAA	TATTAATTT	AAAAAAATAA	AAATTAAAGA	800
AAATATTTAT	TACAAGTTGA	TAAGAGATCT	ATTAAGATTA	CCTAGTGATA	850
TAAAGCATT	TTTCAAAGGA	AAATAAA			876

SEQ ID NO: 5. Amino acid sequence of bifunctional sialyltransferase *cstII* encoded by ORF 7a of *LOS* biosynthesis locus from *C. jejuni* serotype O:10

	10	20	30	40	50
1	MKKVIIAGNG	PSLKEIDYSR	LPNDFDVFR	NQFYFEDKYY	LGKKFKAVFY
51	NPGLFFEQQYY	TLKHЛИQNQE	YETELIMCSN	YNQAHLENEN	FVKTFYDYFP
101	DAHLGYDFFK	QLKEFNAYFK	FHEIYLNQRI	TSGVYMCAVA	IALGYKEIYL
151	SGIDFYQNGS	SYAFDTKQEN	LLKLAPDFKN	DRSHYIGHSK	NTDIKALEFL
201	EKTYKIKLYC	LCPNSLLANF	IELAPNLNSN	FIIQEKNNYT	KDILIPSSEA
251	YGKFSKNINF	KKIKIKENIY	YKLKDLLRL	PSDIKHYFKG	K

SEQ ID NO: 6. Nucleotide sequence of *C. jejuni* serotype O:41 *cstII* coding region

ATGAAAAAAAG	TTATTATTGC	TGGAAATGGA	CCAAGTTAA	AAGAAATTGA	50
TTATTCAAGA	CTACCAAATG	ATTTTGATGT	ATTTAGATGC	AATCAATT	100
ATTTTGAAGA	TAAATACTAT	CTTGGTAAAAA	AATGCAAAGC	AGTATT	150
AATCCTAGTC	TTTTTTTG	ACAATACTAC	ACTTTAAAAC	ATTTAATCCA	200
AAATCAAGAA	TATGAGACCG	AACTAATCAT	GTGTTCTAAT	TTAACCAAG	250
CTCATCTAGA	AAATCAAAT	TTTGTA	CTTTTACGA	TTATTTCC	300
GATGCTCATT	TGGGATATGA	TTTTTCAAA	CAACTTAAAG	AATTCAATGC	350
TTATTTTAAA	TTTCACGAAA	TTTATTCAA	TCAAAGAATT	ACCTCAGGGG	400
TCTATATGTG	CACAGTAGCC	ATAGCCCTAG	GATACAAAGA	AATTATCTT	450
TCGGGAATTG	ATTTTATCA	AAATGGATCA	TCTTATGCTT	TTGATACCAA	500
ACAAAAAAAT	CTTTTAAAT	TGGCTCCTAA	TTTTAAAAT	GATAATTCAC	550
ACTATATCGG	ACATAGAAA	AATACAGATA	TAAAAGCTT	AGAATTCTA	600
GAAAAAAACTT	ACGAAATAAA	GCTATATTGT	TTATGTCTA	ACAGTCTTT	650
AGCAAATT	ATAGAACTAG	CGCCAAATT	AAATTCAAAT	TTTATCATA	700
AAGAAAAAA	TAAC	AAAGATATAC	TCATACCTC	TAGTGAGGCT	750
TATGGAAAAT	TTACAAAAAA	TATTAATT	AAAAAAATAA	AAATTAAAGA	800
AAATATTTAT	TACAAGTTGA	TAAGAGATCT	ATTAAGATTA	CCTAGTGATA	850
TAAAGCATT	TTTCAAAGGA	AAATAAA			876

SEQ ID NO: 7. Amino acid sequence of *CstII* from *C. jejuni* serotype O:41

	10	20	30	40	50
1	MKKVIIAGNG	PSLKEIDYSR	LPNDFDVFR	NQFYFEDKYY	LGKKCKAVFY
51	NPSLFFEQQYY	TLKHЛИQNQE	YETELIMCSN	FNQAHLENQN	FVKTFYDYFP
101	DAHLGYDFFK	QLKEFNAYFK	FHEIYFNQRI	TSGVYMCTVA	IALGYKEIYL
151	SGIDFYQNGS	SYAFDTKQKN	LLKLAPNFKN	DRSHYIGHSK	NTDIKALEFL
201	EKTYEIKLYC	LCPNSLLANF	IELAPNLNSN	FIIQEKNNYT	KDILIPSSEA
251	YGKFTKNINF	KKIKIKENIY	YKLKDLLRL	PSDIKHYFKG	K

SEQ ID NO: 8. Nucleotide sequence of coding region for *CstII* from *C. jejuni* O:19.

1 atgaaaaaaag ttattattgc tggaaatgga ccaagttaa aagaaaattga  
51 ttattcaagg ctaccaaattg attttgatgt atttagatgt aatcaatttt  
101 attttgaaga taaatactat cttggtaaaa aatgcaaaagc agtgtttac  
151 acccctaatt tcttcttga gcaatactac actttaaaac attaatcca  
201 aaatcaagaa tatgagaccg aactaattat gtgttctaatt tacaaccaag  
251 ctcatactaga aaatgaaaat tttgtaaaaa ctttttacga ttatttcct  
301 gatgctcatt tggatataatgaa tttttttaaa caacttaaaag aatttaatgc  
351 ttattttaaa tttcacgaaa tttatccaa tcaaagaatt acctcagggg  
401 tctatatgtg tgcagtagcc atagccctag gatacaaaga aatttatctt  
451 tcggaaattt atttttatca aaatgggtca tctttagtgc ttgataccaa  
501 acaagaaaat cttttaaaac tagcccctga ttttaaaaat gatcgctcgc  
551 actatatcgg acatagtaaa aatacagata taaaagctt agaatttctt  
601 gaaaaaaactt acaaaaataaa actatattgc ttatgtccta atagtcttt  
651 agcaaaatttt atagaacttag cgccaaattt aaattcaaat ttatcatac  
701 aagaaaaaaa taactacact aaagatatac tcataccctc tagtgaggct  
751 tatggaaaaat tttcaaaaaa tattaatttt aaaaaaataa aaattaaaga  
801 aaatgtttat tacaagttga taaaagatct attaagatta cctagtgata  
851 taaagcatta tttcaaaagga aaataa

SEQ ID NO: 9: Amino acid sequence of *CstII* from *C. jejuni* O:19.

1 MKKVI IAGNG PSLKEIDYSR LPNDFDVFR C NQFYFEDKYY LGKKCKAVFY  
51 TPNFFFEQYY TLKHLIQNQE YETELIMCSN YNQAHLENEN FVKTFYDYFP  
101 DAHLGYDFFK QLKEFNAYFK FHEIYFNQRI TSGVYMCABA IALGYKEIYL  
151 SGIDFYQNGS SYAFDTKQEN LLKLAPDFKN DRSHYIGHSK NTDIKALEFL  
201 EKTYKIKLYC LCPNSLLANF IELAPNLNSN FIIQEKNNYT KDILIPSSEA  
251 YGKFSKNINF KKIKIKENVY YKLIKDLRL PSDIKHYFKG K

SEQ ID NO: 10. Amino acid sequence of *CstII* from *C. jejuni* strain NCTC 11168

	10	20	30	40	50
1	MSMNINALVC	GNGPSLKNID	YKRLPKQFDV	FRCNQFYFED	RYFVGKDVKY
51	VFFNPFVFFE	QYYTSKKLIQ	NEEYNIEENIV	CSTINLEYID	GFQFVDNFEL
101	YFSDAFLGHE	IIKKLKDFFA	YIKYNEIYNR	QRITSVYMC	ATAVALGYKS
151	IYISGIDFYQ	DTNNLYAFDN	NKKNLLNKCT	GFKNQKFKFI	NHSMACDLQA
201	LDYLMKRYDV	NIYSLNSDEY	FKLAPDIGSD	FVLSKKPKKY	INDILIPDKY
251	AQERYYYGKKS	RLKENLHYKL	IKDLIRLPSD	IKHYLKEKYA	NKRN

SEQ. ID NO: 11. Nucleotide sequence for coding region for *Cst III* from *C. jejuni* 0:4

1 ATGAAAAAAAG TTATTATTGC TGGAAATGGA CCAAGTTAA AAGAAATTGA TTATTCAAGG  
61 CTACCAAATG ATTTGATGT ATTTAGATGT AATCAATTAA ATTGAAAGA TAAATACTAT  
121 CTTGGTAAAAA AATGCAAAGC AGTGTTCAC ACCCCTGGTT TCTCTTTGA GCAAACTAC  
181 ACTTTAAAAC ATTTAATCCA AAATCAAGAA TATGAGACCG AACTAATTAT GTGTTCTAAT  
241 TACAACCAAG CTCATCTAGA AAATGAAAAT TTTGTAAAAA CTTTTTACGA TTATTTCCCT  
301 GATGCTCATT TGGGATATGA TTTTTTAAAC CAACTAAAG AATTTAATGC TTATTTAAA  
361 TTTCACGAAA TTATTTCAA TCAAAGAATT ACCTCAGGGG TCTATATGTG TGCAGTAGCC  
421 ATAGCCCTAG GATACAAAGA AATTATCTT TCGGGAAATTG ATTGTTATCA AAATGGGTCA  
481 TCTTATGCTT TTGATACCAA ACAAGAAAAT CTTTTAAAAC TAGCCCCCTGA TTTTAAAAAT  
541 GATCGCTCAC ACTATATCGG ACATAGTAAA AATACAGATA TAAAAGCTTT AGAATTCTA

601 GAAAAAACTT ACAAAATAAA ACTATATTGC TTATGTCCTA ACAGTCTTT AGCAAATTT  
 661 ATAGAACTAG CGCCAAATT AAATTCAAAT TTTATCATAAC AAGAAAAAAA TAACTACACT  
 721 AAAGATATAC TCATACCTTC TAGTGAGGCT TATGGAAAAT TTTCAAAAAA TATTAATTT  
 781 AAAAAATAA AAATTAAGA AAATGTTAT TACAAGTTGA TAAAAGATCT ATTAAGATTA  
 841 CCTAGTGATA TAAAGCATTA TTTCAAAGGA AAA

SEQ ID NO: 12. Amino acid sequence of Cst II from *C. jejuni* 0:4

MKKVIIAGNG PSLKEIDYSR LPNDFDVFRQ NQFYFEDKYY LGKKCKAVFY TPGFFFEQY  
 YTLKHLIQNQ EYETELIMCS NYNQAHLENE NFVKTFYDYF PDAHLGYDFK KQLKEFNAY  
 FKFHEIYFNQ RITSGVYMCA VAIALGYKEI YLSGIDFYQN GSSYAFDTKQ ENLLKLAPD  
 FKNDRSHYIG HSKNTDIKAL EFLEKTYKIK LYCLCPNSLL ANFIELAPNL NSNFIIQEK  
 NNYTKDILIP SSEAYGKFSK NINFKKIKIK ENVYYKLIKD LLRLPSDIKH YFKGK

SEQ ID NO: 13. Nucleotide sequence for coding region for Cst II from *C. jejuni* 0:36

ATGAAAAAG TTATTATTGC TGGAAATGGA CCAAGTTAA AAGAAATTGA TTATTCAGG  
 CTACCAAATG ATTTTGATGT ATTTAGATGT AATCAATTAA TTTTGAGAAGA TAAATACTAT  
 CTTGGTAAAA AATGCAAAC AGTGTTCAC ACCCCTAATT TCTTCTTGAGA GCAATACTAC  
 ACTTTAAAC ATTTAATCCA AAATCAAGAA TATGAGACCG AACTAATTAT GTGTTCTAAT  
 TACAACCAAG CTCATCTAGA AAATGAAAAT TTTGTAAAAA CTTTTTACGA TTATTTCCCT  
 GATGCTCATT TGGGATATGA TTTTTTTAAA CAACTTAAAG AATTTAATGC TTATTTTAAA  
 TTTCACGAAA TTTTATTCAA TCAAAGAATT ACCTCAGGGG TCTATATGTG TGCAGTAGCC  
 ATAGCCCTAG GATACAAAGA AATTATCTT TCAGGAATTG ATTTTATCA AAATGGGTCA  
 TCTTATGCTT TTGATACCAA ACAAGAAAAT CTTTTAAAC TAGCCCCCTGA TTTTAAAAAT  
 GATCGCTCAC ACTATATCGG ACATAGTAAA AATACAGATA TAAAAGCTTT AGAATTCTA  
 GAAAAAACTT ACAAAATAAA ACTATATTGC TTATGTCCTA ATAGTCTTTT AGCAAAATTT  
 ATAGAACTAG CGCCAAATT AAATCAAAT TTTATCATAAC AAGAAAAAAA TAACTACACT  
 AAAGATATAC TCATACCTTC TAGTGAGGCT TATGGAAAAT TTTCAAAAAA TATTAATTT  
 AAAAAATAA AAATTAAGA AAATGTTAT TACAAGTTGA TAAAAGATCT ATTAAGATTA  
 CCTAGTGATA TAAAGCATTA TTTCAAAGGA AAA

SEQ ID NO: 14. Amino acid sequence of Cst II from *C. jejuni* 0:36.

MKKVIIAGNG PSLKEIDYSR LPNDFDVFRQ NQFYFEDKYY LGKKCKTVFY TPNFFFEQY  
 YTLKHLIQNQ EYETELIMCS NYNQAHLENE NFVKTFYDYF PDAHLGYDFK KQLKEFNAY  
 FKFHEIYFNQ RITSGVYMCA VAIALGYKEI YLSGIDFYQN GSSYAFDTKQ ENLLKLAPD  
 FKNDRSHYIG HSKNTDIKAL EFLEKTYKIK LYCLCPNSLL ANFIELAPNL NSNFIIQEK  
 NNYTKDILIP SSEAYGKFSK NINFKKIKIK ENVYYKLIKD LLRLPSDIKH YFKGK

SEQ ID NO: 15: Nucleotide sequence of glycosyltransferase-encoding ORF 4a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384

ATGAAGAAAA	TAGGTGTAGT	TATACCAATC	TATAATGTAG	AAAAATATTT	50
AAGAGAATGT	TTAGATAGCG	TTATCAATCA	AACTTATACT	AACTTAGAAA	100
TCATACTTGT	CAATGATGGT	AGCACAGATG	AACACTCACT	CAATATTGCA	150
AAAGAATATA	CCTTAAAAGA	TAAAAGAATA	ACTCTTTTG	ATAAGAAAAA	200
TGGGGGTTTA	AGTCAGCTA	GAAATATAGG	TATAGAATAC	TTTAGCGGGG	250
AATATAAATT	AAAAAACAAA	ACTCAACATA	TAAAAGAAAA	TTCTTTAATA	300
GAATTTCAT	TGGATGGTAA	TAATCCTTAT	AATATATATA	AAGCATATAA	350
AAGCTCTCAA	GCTTTAATA	ATGAAAAAGA	TTTAACCAAT	TTTACTTACC	400
CTAGTATAGA	TTATATTATA	TTCTTAGATA	GTGATAATTA	TTGGAAACTA	450
AACTGCATAG	AAGAATGCGT	TATAAGAATG	AAAAATGTGG	ATGTATTGTG	500
GTTCGACCAT	GATTGCACCT	ATGAAGACAA	TATAAAAAAT	AAGCACAAAA	550
AAACAAGGAT	GGAAATTTT	GATTTAAAAA	AAGAATGTAT	AATCACTCCA	600

AAAGAATATG	CAAATCGAGC	ATTAAGTGTA	GGATCTAGAG	ATATTCTTT	650
TGGATGGAAT	GGAATGATTG	ATTTTAATT	TTTAAAGCAA	ATTAAACTTA	700
AATTTATAAA	TTTTATTATC	AATGAAGATA	TACACTTTGG	GATAATTGG	750
TTTGCTAGTG	CTAATAAAAT	TTATGTTTA	TCACAAAAGT	TGTATTGTG	800
TCGTTAAGA	GCAAACAGTA	TATCAAATCA	TGATAAGAAG	ATTACAAAAG	850
CAAATGTGTC	AGAGTATTTT	AAAGATATAT	ATGAAACTTT	CGGGGAAAAC	900
GCTAAGGAAG	CAAAAAATT	TTTAAAGCA	GCAAGCAGGG	TTATAACTGC	950
TTTAAAATTG	ATAGAATT	TTAAAGATCA	AAAAAACGAA	AATGCACTTG	1000
CTATAAAAGA	AACATT	CCTGCTATG	CCAAAAAAAGC	TTTAATGATT	1050
AAAAAAATT	AAAAAGATCC	TTTAAATT	AAGGAACAAT	TAGTTTAAT	1100
TAAACCTTT	ATTCAAACAA	AACTCCTTA	TGATATTGG	AAATTTGGC	1150
AAAAAAATAA	AAATATTAA				1170

SEQ ID NO: 16: Nucleotide sequence of  $\beta$ 1,4 GalNAc transferase-encoding ORF 5a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384

ATGCTATTC	AATCATACTT	TGTGAAAATA	ATTTGCTTAT	TCATCCCTT	50
TAGAAAAATT	AGACATAAAA	TAAAAAAAAC	ATTTTACTA	AAAAACATAC	100
AACGAGATAA	AATCGATTCT	TATTTACCAA	AAAAAAACTCT	TGTGCAAATT	150
AATAAATACA	ACAATGAAGA	TTTAATTAAA	CTTAATAAG	CTATTATAGG	200
GGAGGGGCAT	AAAGGATATT	TTAATTATGA	TGAAAAATCT	AAAGATCCAA	250
AATCTCCTT	GAATCCTTGG	GCTTTTATAC	GAGTAAAAAA	TGAAGCTATT	300
ACCTTAAAG	CTTCTCTTGA	AAGCATATTG	CCTGCTATCC	AAAGAGGTGT	350
TATAGGATAT	AATGATTGTA	CCGATGGAAG	TGAAGAAATA	ATTCTAGAAT	400
TTTGCAAACA	ATATCCTCA	TTTATACCAA	AAAAATATCC	TTATGAAATT	450
CAAATTCAAA	ACCCAAAATC	AGAAGAAAAT	AAACTCTATA	GCTATTATAA	500
TTATGTTGCA	AGTTTATAC	CAAAAGATGA	GTGGCTTATA	AAAATAGATG	550
TGGATCATAT	CTATGATGCT	AAAAAACTTT	ATAAAAGCTT	CTATATACCA	600
AAAAACAAAT	ATGATGTAGT	TAGTTATTCA	AGGGTTGATA	TTCACTATTT	650
TAATGATAAT	TTTTTCTTT	GTAAAGATAA	TAATGGCAAT	ATATTGAAAG	700
AACCAGGAGA	TTGCTTGCTT	ATCAATAATT	ATAACTTAAA	ATGAAAGAA	750
GTATTAATTG	ACAGAATCAA	TAACAATTGG	AAAAAAAGCAA	CAAAACAAAG	800
TTTTCTTCA	AATATACACT	CTTAGAGCA	ATTAAGTAT	AAACACAGGA	850
TATTATTCA	CACTGAATT	AATAATTATC	ATTTCTT	TTAAAAAAA	900
CATAGAGCTC	AAGATATT	AAATATAAT	TGGATAAGTA	TTGAAGAATT	950
AAAAAAATT	TATTACAAA	ATATTAATCA	AAAAATAGAA	CCTTCTATGA	1000
TTTCAAAAGA	AACTCTAAA	AAAATATTCT	TAACATTGTT	TTAA	1044

SEQ ID NO: 17: Amino acid sequence of  $\beta$ 1,4 GalNAc transferase from *C. jejuni* strain OH4384 (encoded by ORF 5a of *LOS* biosynthesis locus)

	10	20	30	40	50
1	MLFQS <sup>Y</sup> FVKI	ICLFIPFRKI	RHKIKKTFLL	KNIQRDKIDS	YLPKKTLVQI
51	NKYNNE <sup>D</sup> LIK	LNKAIIGEH <sup>G</sup>	KGYFNYDEKS	KDPKSPLNPW	AFIRVKNEAI
101	TLKASLESIL	PAIQRGVIGY	NDCTDGSEEI	ILEFCKQYPS	FIPIKYPYEI
151	QIQNPKSEEN	KLYSY <sup>Y</sup> NYVA	SFIPKDEWLI	KIDVDHIYDA	KKLYKSFYIP
201	KNKYDVVSYS	RVDIHYFNDN	FFLCKDNNGN	ILKEPGDCLL	INNYNLKWKE
251	VLIDRINNNW	KKATKQSFSS	NIHSLEQLKY	KHRILFTEL	NNYHFPFLKK
301	HRAQDIYKYN	WISIEEFKKF	YLQNIHKIE	PSMISKETLK	KIFLT

**SEQ. ID NO: 18. Nucleotide sequence of  $\beta$ -1,4-GalNAc transferase from *C. jejuni* 0:1.**

ATGACTTTGT TTTATAAAAT TATAGCTTT TTAAGATTGC TTAAAATTGA TAAAAAATTAA  
AAATTTGATA ATGAATATT TTTAAACTTA AATAAAAAAA TCTACAATGA AAAGCATAAA  
GGTTTTTTG ATTTGATCC AAACCTAAAA GATACAAAAT CTCCTTTAAA TCCATGGGCT  
TTTATAAGAG TAAAAAATGA AGCCACTACT TTAAGAGTAT CACTTGAAAG TATGTTACCT  
GCCATACAAA GAGGTGTTAT AGGATATAAT GATTGTACTG ATGGAAGTGA AGAAATTATT  
TTGGAATTTC GCAAACAATA CCCTTCGTTT ATACCACTGAA AATATCCCCA TGAGGTGCAA  
ATTGAAAATC CGCAAAGCGA AGAAAATAAA CTTCATAGTT ATTATAACTA TGATGCTAGT  
TTTATACCGC AAGATGAGTG GCTTAAAAAA ATAGATGTGG ATCATTACTA TGATGCAAA  
AAATTATATA AGAGTTTTA TATGCATCA AAAAATACTG CTGTTAGATT TCCAAGAATT  
AATTTTTAA TACTAGATAA AATTGTAATT CAAAATATAG GAGAATGTGG TTTTATCGAT  
GGAGGGGATC AATTGTTAAT TCAAAAGTGC AATAGTGTAT TTATAGAAAG AATGGTTCA  
AAGCAAAGTC AGTGGATTGA TCCTGAAAAA ACTGTGAAAG AATTGTTATC TGAACAGCAA  
ATTATACCCA AACATATAAA AATCTTACAA GCAGAATTAC TTCATGGCA TTTTCTGCT  
TTAAAATATC ATAGAAATGA TTATCAAAAA CATTGGATG CTTAACCTT AGAAGATT  
AAAAAAATCC ATTATAGACA TAGAAAAATA AAGAAAATAA ATTATACAAT GCTTGATGAA  
AAAGTAATTC GTGAAATATT AGATAAATT AAATGAGTG GTAAAAAAAT GACTTTAGCT  
ATAATACCTG CTCGAGCTGG TTCAAAAGGT ATAAAAAAAT AAAATTAGC TCTTTGCT  
GATAGGCTT TGTGTTATT TACTATCAAT GCAGCAAAA ATTCAAGTA TGAGATAAA  
ATTGTTTAA GTAGTGTAGG CGATGATATA TTAGAATATG GACAAACTCA AGGTGTAGAT  
GTGTTAAAAA GACCTAAAGA ATTAGCGCTA GATGATACAA CTAGTGATAA GGTGTTATTG  
CATACCTTGA GTTTTTATAA AGATTATGAA AATATTGTT TATTACAACC CACTTCCT  
TTAAGGACAA ATGTACATAT AGATGAAGCT TTTTAAAT TTAAAATGA AAACCAAAT  
GCATTAATAA GTGTTGAGA ATGTGATAAT AAAATTAA AAGCTTTAT AGATGATAAT  
GGTAACTTAA AAGGAATTG TGATAACAAA TATCCATTAA TGCTTAGACA AAAATTACCA  
AAAACCTATA TGAGTAATGG TGCAATTAT ATAGTAAGT CAAATTATT TTTAAATAAC  
CCAACTTTC TACAAGAAAA AACAAAGTGC TATATAATGG ACGAAAAGC TAGTTGGAT  
ATAGATACAA CAGAGGATT AAAAGAGTT AATAATATAA GCTCTTA

**SEQ. ID NO: 19. Amino Acid sequence of  $\beta$ -1,4-GalNAc transferase from *C. jejuni* 0:1.**

MTLFYKIIAF LRLLKIDKKL KFDNEYFLNL NKKIYNEKHK GFFDFDPNSK DTKSPLNPW  
AFIRVKNEAT TLRSLESML PAIQRGVIGY NDCTDGSEEI ILEFCKQYPS FIPVKYPHE  
VQIENPQSEE NKLHSYYNYV ASFIPQDEWL IKIDVDHYD AKKLYKSFYM ASKNTAVRF  
PRINFLILDK IIVIQNIGECG FIDGGDQLLI QKCNVFIER MVSQKQSOWID PEKTVKELY  
SEQQIIPKHI KILQAEELLQW HFPALKYHRN DYQKHLDALE LEDFKKIHYR HRKIKKINY  
TMLDEKVIRE ILDKFKLSGK KMTLAIIPAR AGSKGIKKN LALLHDRPLL YYTINA  
SKYVDKIVLS SDGDDILEYQ QTQGVDVLRK PKELALDDTT SDKVVLHTLS FYKDYENIV  
LLQPTSPRLRT NVHIDEAFLK FKNENSNALI SVVECDNKIL KAFIDDNGNL KGICDNKYP  
FMPRQKLPKT YMSNGAIYIV KSNLFLNNPT FLQEKTSCYI MDEKASLDID TTEDLKR  
VNNI SFL

**SEQ. ID NO: 20. Nucleotide sequence of  $\beta$ -1,4-GalNAc transferase from *C. jejuni* 0:10.**

ATGCTATTTC AATCATACTT TGTGAAAATA ATTTGCTTAT TCATCCCTTT TAGAAAAATT  
AGACATAAAA TAAAAAAAC ATTTTACTA AAAAACATAC AACGAGATAA AATCGATTCT  
TATCTACCAA AAAAAACTCT TATACAAATT AATAAATACA ACAATGAAGA TTTAATTAAA  
CTTAATAAAG CTATTATAGG GGGGGGGCAT AAAGGATATT TTAATTATGA TGAAAATCT  
AAAGATCCAA AATCTCCTT GAATCCTTGG GCTTTTATAC GAGTAAAAAA TGAAGCTATT  
ACCTAAAAG CTTCTCTTGA AAGCATATTG CCTGCTATT AAAGAGGTGT TATAGGATAT  
AATGATTGCA CCGATGGAAG TGAAGAAATA ATTCTAGAT TTGCAAACA ATATCCTCA  
TTTATACCAA TAAAATATCC TTATGAAATT CAAATTCAA ACCAAATC AGAAGAAAAT  
AAACTCTATA GCTATTATAA TTATGTTGCA AGTTTTATAC CAAAGATGA GTGGCTCATA  
AAAATAGATG TGGATCATTA TTATGATGCA AAAAATATT ATAAGAGTTT TTATATACCT  
AGAAAAAATT ATCATGTAAT TAGTTACTCT AGGATAGATT TTATATTTAA TGAAGAAAAA  
TTTTATGTTT ATCGGAATAA GGAGGGGGAG ATTTTAAAG CTCCCTGGAGA TTGTTTAGCA  
ATACAAAACA CTAACCTATT TTGGAAAGAA ATACTTATTG AAGATGATAC ATTTAAGTGG  
AATACTGCAA AAAATAATAG AGAGAATGCA AAATCATATG AAATTTAAA AGTTAGAAAT  
AGAATTATT TTACTACAGA ACTTAATAAT TATCATTTC CATTATATAA AAATTATAGA  
AAAAATGATT ATAAGCAGTT AAATTGGGTT AGCTTAGATG ATTTTATTAA AAATTATAAA  
GAAAAATTAA AAAATCAAAT AGATTTAAA ATGCTAGAAT ACAAAACATT AAAAAGTG  
TACAAAAAGC TTACATCTTC AGCAAGCGAT AAAATT

**SEQ. ID NO: 21. Amino acid sequence of  $\beta$ -1,4-GalNAc transferase from *C. jejuni* 0:1.**

MLFQS YFVKI ICLFIPFRKI RHKIKKTFLL KNIQRDKIDS YLPKKTLIQI NKYNNE DLI  
KLNKAIIGGG HKGYFNYDEK SKDPKSPLNP WAFIRVKNEA ITLKASLESI LPAlQRGVI  
GYNDCTDGSE EIILEFCKQY PSFIPIKYPY EIQIQNPKSE ENKLYSYNNY VASFIPKDE  
WLKIDVDHY YDAKKLYKSF YIPRKNYHVI SYSRIDFIFN EEEKFYVYRNK EGEILKAPG  
DCLAIQNTNL FWKEILIEEDD TFKWNTAKNN IENAKSYEIL KVRNRIYFTT ELNNYHFPF  
IKNYRKNDYK QLNWVSLDDF IKNYKEKLKN QIDFKMLEYK TLKKVYKLLT SSASDKI

**SEQ. ID NO: 22. Nucleotide sequence of  $\beta$ -1,4-GalNAc transferase from *C. jejuni* 0:1.  
0:36**

DNA:

ATGCTAAAAA AAATCATTTC TTTATATAAA AGATACTCGA TTTCTAAAAA ATTGGTTTA  
GATAATGAGC ATTCATTAA GGAAAATAAA AACATCTATG GAAAAAAACA TAAGGGCTTT  
TTTGACTTTG ATGAAAAGGC TAAGGATGTG AAATCACCCC TTAATCCTTG GGGATTATC  
AGGGTTAAAA ATGAGCTTT AACCTTAAGA GATGATGGGA GTGAAGAGCT TATTTAGAA  
CAAAGAGGAA TTATAGCTA CAACGACTGT AAAAATATC CTTATAAAAGT AGATCTAGAA  
TTTGCAAGC AATATCCCA CTTCATGCT TCTTATTACA ATTGGGCAGC ATCTTTATA  
AATCCTAAAA ATGAAGAAA TAAACCTTAC CCCTTAGATG AGTGGTTAT AAAAATCGAT  
TATAAGAGTT TTATAGGAT TGATCAGAA AATAAAGCCT TATGCTACCC AAGAATTAAT  
TTTATAATCT TAAATGGAAA TATTATGTG CAAAATAGTG GAAATTATGG ATTCA TAGGG  
GGGGGGGATC AACTCTTGAT TAAAAGAAGA AATAGTAGCT TTATAGAAAG AAGGGTTCA A  
AAAAAAGCCA ATGGATAGAT CCTAAGGGAC TTATAGAAGA ACTCTACTCC GAGCAACAAG  
TCTTATCTCA AGGAGTGGAA ATACTACAAG CTCCCCTACT TCAGTGGCAT TTTCTGCCT  
TAAAATACCG CCGAAACGAT TACCAACAAT ATTTAGATAT CTTGAGTTA GAAGAATTC  
AGGCCTTCA TCGTAAGAGC AAAGAGGCTA AAAAATAGA CTTGCCATG CTAAAACGCC  
CTGTAATCGA GCAAATATTA AAGAAATTTC AAGGAGAGAT AAAA

**SEQ. ID NO: 23. Amino acid sequence of  $\beta$ -1,4-GalNAc transferase from *C. jejuni*  
0:36.**

MLKKIIISLYK RYSISKKLVL DNEHFIKENK NIYGKKHKGF FDFDEKAKDV  
KSPLNPWGFI RVKNEALTLR VSLESILPAL QRGIIAYNDC DDGSEELILE  
FCKQYPNFIA KKPYKVDLE NPKNEENKLY SYYNWAASFI PLDEWFHKID  
VDHYYDAKKL YKSFYRIDQE NKALCYPRIN FIILNGNIYV QNSGNYGFIG  
GGDQLLIKRR NSSFIERRVS KKSQWIDPKG LIEELYSEQQ VLSQGVKILQ  
APLLQWHFPA LKYRRNDYQQ YLDILSLEEF QAFHRKSKEA KKIDFAMLKR  
PVIEQILKKF QGEIK

**SEQ. ID NO: 24. Nucleotide sequence of  $\beta$ -1,4-GalNAc transferase from *C. jejuni*  
NCTC11168**

ATGACTTTGT TTTATAAAAT TATAGCTTT TTAAGATTGC TAAATATTGA TAAAAAATTA  
AAATTGATA ATGAATATT TTTAAACTTA AATAAAAAA TCTACGATGA AAAGCATAAA  
GGTTTTTTG ATTTGATCC AAACCTAAAAA GATACAAAAT CTCCCTTAA TCCATGGCT  
TTTATAAGAG TAAAAAATGA AGCCACTACT TTAAGAGTAT CACTGAAAG TATGTTACCT  
GCCATACAAA GAGGTGTTAT AGGATATAAT GATTGTACTG ATGGAAGTGA AGAAATTATT  
TTGGAATTT GCAAACAATA CCCTCGTT ATACCAAGTAA AATATCCCCA TGAGGTGCAA  
ATTGAAAATC CGCAAAGCGA AGAAAATAAA CTTCATAGTT ATTATAACTA TGTAGCTAGT  
TTTATACCGC AAGATGAGTG GCTTATAAAA ATAGATGTGG ATCATTACTA TGATGCAAAA  
AAATTATATA AGAGTTTTA TATGGCATCA AAAAATACTG CTGTTAGATT TCCAAGAATT  
AATTTTTAA TACTAGATAA AATTGTAATT CAAAATATAG GAGAATGTGG TTTTATCGAT  
GGAGGGGATC AATTGTTAAT TCAAAAGTGC AATAGTGTAT TTATAGAAAG AATGGTTCA

AAGCAAAGTC AGTGGATTGA TCCTGAAAAA ACTGTGAAAG AATTGTATTG TGAACAGCAA  
 ATTATACCA AACATATAAA AATCTTACAA GCAGAATTAC TTCAATGGCA TTTTCTGCT  
 TTAAAATATC ATAGAAATGA TTATCAAAAA CATTGGATG CTTAACTTT AGAAGATTT  
 AAAAAAATCC ATTATAGACA TAGAAAATA AAGAAAATAA ATTATACAAT GCTTGATGAA  
 AAAGTAATTG GTGAAATATT AGATAAAATT AAATTGAGTG GTAAAAAAAT GACTTTAGCT  
 ATAATACCTG CTCGAGCTGG TTCAAAAGGT ATAAAAAATA AAAATTAGC TCTTTGCAT  
 GATAGGCCTT TGTTGTATTA TACTATCAAT GCAGCAAAA ATTCAAAGTA TGTAGATAAA  
 ATTGTTTAA GTAGTGATGG CGATGATATA TTAGAATATG GACAAACTCA AGGTGTAGAT  
 GTGTTAAAAA GACCTAAAGA ATTAGCGCTA GATGATACAA CTAGTGATAA GGTTGTATTG  
 CATACTTGA GTTTTTATAA AGATTATGAA AATATTGTT TATTACAACC CACTTCTCCT  
 TTAAGGACAA ATGTACATAT AGATGAAGCT TTTTTAAAAT TAAAAAATGA AACTCAAAT  
 GCATTAATAA GTGTTGTAGA ATGTGATAAT AAAATTAAAGCTTTAT AGATGATAAT  
 GGTAACTTAA AAGGAATTG TGATAACAAA TATCCATTAA TGCTTAGACA AAAATTACCA  
 AAAACTTAA TGAGTAATGG TGCAATTAT ATAGTAAAGT CAAATTATT TTTAAATAAC  
 CCAACTTTTC TACAAGAAAA AACAAAGTTGC TATATAATGG AGAAAAAAGC TAGTTGGAT  
 ATAGATACAA CAGAGGATT AAAAAGAGTT AATAATATAA GCTTCTTA

**SEQ. ID NO: 25. Amino Acid sequence of  $\beta$ -1,4-GalNAc transferase from *C. jejuni* NCTC11168**

MTLFYKIIIAF LRLLKIDKKL KFDNEYFLNL NKKIYDEKHK GFFDFDPNSK DTKSPLNPW  
 AFIRVKNEAT TLRVSLESML PAIQRGVIGY NDCTDGSEEI ILEFCKQYPS FIPVKYPHE  
 VQIENPQSEE NKLHSYYNYV ASFIPQDEWL IKIDVHDHYD AKKLYKSFYM ASKNTAVRF  
 PRINFLILDK IVIQNIGECG FIDGGDQLLI QKCNSVFIER MVSQSQWID PEKTVKELY  
 SEQQIIPKHI KILQAEELLQW HFPALKYHRN DYQKHLDALT LEDFKKIHRY HRKIKKINY  
 TMLDEKVIRE ILDKFKLSGK KMTLAIIPAR AGSKGIKNKN LALLHDRPLL YYTINAAKN  
 SKYVDKIVLS SDGDDILEYQ QTQGVDVLKR PKELALDDTT SDKVVLHTLS FYKDYENIV  
 LLQPTSPRLT NVHIDEAFLK FKNENSNALI SVVECDNKIL KAFIDDNGNL KGICDNKYP  
 FMPRKLPKT YMSNGAIYIV KSNLFLNNPT FLQEKTSCYI MDEKASLDID TTEDLKRVNN ISFL

**SEQ ID NO: 26: Nucleotide sequence of  $\beta$ 1,3-galactosyltransferase-encoding ORF 6a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384**

ATGTTTAAAA	TTTCAATCAT	CTTACCAACT	TATAATGTGG	AACAATATAT	50
AGCAAGGGCA	ATAGAAAGCT	GTATCAATCA	GACTTTAAA	GATATAGAAA	100
TAATTGTAGT	TGATGATTGT	GGAAATGATA	ATAGTATAAA	TATAGCCAAA	150
GAATACTCTA	AAAAAGACAA	AAGAATAAAA	ATAATCCACA	ATGAAAAAAA	200
CTTAGGTCTT	TTAAGAGCAA	GATATGAAGG	TGTGAAAGTA	GCAAACCTCTC	250
CTTATATAAT	GTTTTTAGAT	CCTGATGATT	ATTTGGAACT	AAATGCTTGT	300
GAAGAGTGT	TAAAAATT	AGATGAACAG	GATGAAGTTG	ATTTAGTGT	350
TTTCAATGCT	ATTGTTGAAA	GTAATGTTAT	TTCATATAAA	AAGTTTGACT	400
TTAATTCTGG	TTTTTATAGC	AAAAAAAGAT	TTGTAAAAAA	AATTATTGCA	450
AAGAAAATT	TATATTGGAC	TATGTGGGG	AAACTTATAA	GAAAGAAATT	500
GTATTTAGAA	GCTTTGCAG	GTTTAAGACT	CGAGAAAGAT	GTTAAAATCA	550
ATATGGCTGA	AGATGTATTG	TTATATTATC	CAATGTTAAG	TCAAGCTCAA	600
AAAATAGCAT	ATATGAACTG	TAATTATAT	CATTACGTGC	CTAATAATAA	650
TTCAATTG	AATACTAAGA	ATGAAGTGCT	TGTTAAAAT	AATATTCAAG	700
AGTTGCAGTT	GGTTTAAAC	TATTTAAGGC	AAAATTATAT	TTTAAACAAG	750
TATTGTAGCG	TTCTCTATGT	GCTAATTAAA	TATTTGCTAT	ATATTCAAAT	800
ATATAAAATA	AAAAGAACAA	AATTAATGGT	TACATTATTA	GCTAAAATAA	850
ATATTTAAC	TTTAAAAATT	TTATTTAAAT	ATAAAAAATT	TTTAAAACAA	900
TGTTAA					906

SEQ ID NO: 27 Amino acid sequence of  $\beta$ 1,3-galactosyltransferase encoded by ORF 6a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384

	10	20	30	40	50
1	MFKISIILPT	YNVEQYIARA	IESCINQTFK	DIEIIVVDDC	GNDNSINIAK
51	EYSKKDKRIK	IIHNEKNLGL	LRARYEGVKV	ANSPYIMFLD	PDDYLELNAC
101	EECIKILDEQ	DEVDLVFFNA	IVESNVISYK	KFDFNSGFYS	KKEFVKKIIA
151	KKNLYWTMWG	KLIRKKLYLE	AFASLRLEKD	VKINMAEDVL	LYYPMLSQAQ
201	KIAYMNCNLY	HYVPNNNSIC	NTKNEVLVKN	NIQELQLVLN	YLRQNYILNK
251	YCSVLYVLIK	YLLYIQIYKI	KRTKLMVTLL	AKINILTLKI	LFKYKKFLKQ
301	C				

SEQ ID NO: 28. Nucleotide sequence of CgtB  $\beta$ 1,3 galactosyltransferase from *C. jejuni* serotype O:2 (strain NCTC 11168).

ATGAGTCAAA	TTTCCATCAT	ACTACCAACT	TATAATGTGG	AAAAATATAT	50
TGCTAGAGCA	TTAGAAAGTT	GCATTAACCA	AACTTTAAA	GATATAGAAA	100
TCATTGAGT	AGATGATTGT	GGTAATGATA	AAAGTATAGA	TATAGCTAAA	150
GAGTATGCTA	GTAAAGATGA	TAGAATAAAA	ATCATAACATA	ATGAAGAGAA	200
TTTAAAGCTT	TTAAGAGCAA	GATATGAAGG	TGCTAAAGTA	GCAACTTCAC	250
CTTATATCAT	GTTTTAGAT	TCTGATGATT	ATTTAGAACT	TAATGCTTGC	300
GAAGAATGTA	TTAAAATTT	GGATATGGGT	GGGGGGGTA	AAATTGATT	350
GTTGTGTTT	GAAGCTTTA	TTACCAATGC	AAAAAAATCA	ATAAAAAAAT	400
TAAATATAAA	ACAAGGAAAA	TACAACAACA	AAGAATTAC	AATGCAAATA	450
CTTAAAACTA	AAAATCCATT	TTGGACAATG	TGGGCTAAAA	TAATCAAAAA	500
AGATATTAT	TTAAAAGCCT	TCAACATGTT	AAATCTCAA	AAAGAAATCA	550
AAATAAATAT	GGCAGAAGAT	GCCTTATTAT	ATTATCCTT	GACAATATTA	600
TCTAATGAAA	TATTTACTT	AACACAACCT	TTGTATACCC	AGCATGTAAA	650
TAGCAATTCT	ATAACAAATA	ATATTAATT	TTTACAAGCT	AATATTCAAG	700
AACATAAAAT	TGTTTAAAT	GTGTTAAAT	CAATTAAAAA	TAACAAACAA	750
CCTCTATATT	TTCTAATTAT	ATATTTATTA	AAAATTCAAT	TATTGAAATA	800
TGAACAAAAT	TTTAATAAAA	GAAATATAAA	TCTTATTAT	TATAAAATAA	850
ATATTTATA	TCAAAAATAT	CAATTCAAAT	GGAAAAAATT	TTTATATAAT	900
TTAATTCCGT	AA				912

SEQ ID NO: 29. Amino acid sequence of CgtB  $\beta$ 1,3 galactosyltransferase from *C. jejuni* serotype O:2 (strain NCTC 11168).

	10	20	30	40	50
1	MSQISIILPT	YNVEKYIARA	LESCINQTFK	DIEIIVVDDC	GNDKSIDI
51	EYASKDDRIK	IIHNEENLKL	LRARYEGAKV	ATSPYIMFLD	SDDYLELNAC
101	EECIKILDMG	GGGKIDLLCF	EAFITNAKKS	IKKLNKQGK	YNKEFTMQL
151	KTKNPFWTMW	AKIIKKDIYL	KAFNMLNLKK	EIKINMAEDA	LLYYPLTILS
201	NEIFYLQPL	YTQHVNSNSI	TNNINSLEAN	IQEHKIVLNV	LKS1KNKKTP
251	LYFLIIYLLK	IQLLKYEQNF	NKRNINLIYY	KINILYQKYQ	FWKKFLYNL
301	IP				

SEQ ID NO. 30: Nucleotide sequence of  $\beta$ -1,3-galactosyl transferase from *C. jejuni* O:10

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ATGTTTAAAA TTTCAATCAT CTTGCCAACT TATAATGTGG AACAAATATAT AGCAAGGGCA
ATAGAAAGTT GTATCAATCA GACTTTAAA AATATAGAAA TAATTGTAGT TGATGATTGT
GGAAGTGACA AAAGTATAGA TATAGTTAAA GAATATGCCA AAAAAGATGA TAGAATAAAA
ATCATAACATA ATGAAGAAAA TTTAAAACCT TTAAGAGCTA GATATGAAGG TGTAAAAGTA
GCAAACCTCTC CTTATATAAT GTTTTAGAT CCTGATGATT ATTTAGAACT TAATGCTTGT
GAAGAATGTA TGAAAATTAA AAAAACAAAT GAAATAGATT TATTATTTTT TAATGCATTT
GTATTGGAAA ATAACAATAA AATAGAAAGA AAGTTGAATT TTCAAGAAAA ATGTTATGTA
AAAAAAGATT TTTTAAAAGA ACTATTAAA ACTAAAATT TATTTGGAC AGTGTGGGCA
AAAGTCATAA AAAAGAATT ATATCTCAAG GCTGTTGGTT TAATATCGCT AGAAAATGCT
AAAATAAAAT TGGCTGAAGA TGTTTATTAA TATTACCCCT TGATAAAATAT TTCAAATACT
ATATTTCACT TGAGTAAAAA TTATACAAAT TATCAAAATAA ATAATTCCTC TATAACCAAA
ACATTAACAT TGCAAAATAT AAAAACAAAT ATACAAGAAC AAGATAATGT TCTATATCTT
CTAAAGAAGA TGCAATATAA TTACAAATTAA AACTTAACCT TGCTTAAATT AATTGAGTAT
TTTTTATTAA TTGAAAAATA CTCATTATCA AGCAAGCGAA ATGTTCTTTG TTTTAAAATC
AATATTTTTT TTAAAAAAAT CCAATTAAA TTTTATCGCT TGCTGAAGAT G
```

SEQ ID NO. 31: Amino acid sequence of  $\beta$ -1,3-galactosyl transferase from *C. jejuni* O:10

```
MFKISIILPT YNVEQYIARA IESCIINQTFK NIEIIVVDDC GSDKSIDIVK EYAKKDDRI
KIIHNEENLK LLRARYEGVK VANSPYIMFL DPDDYLELNA CEECMKILKN NEIDLFFN
AFVLENNNKI ERKLNFQEKC YVKKDFLKEL LKTKNLFWTV WAKVIKKELY LKAVGLISL
ENAKINMAED VLLYYPLINI SNTIFHLSKN LYNYQINNFS ITKTLTLQNI KTNIQEQDN
VLYLLKKMQY NYNFNLTLLK LIEYFLLIEK YSLSSKRNVL CFKINIFFKK IQFKFYRLLK M
```

SEQ ID NO: 32. Amino acid sequence of lipid A biosynthesis acyltransferase (*C. jejuni* OH4384).

```
1 MKNSDRIYLS LYYILKFFVT FMPDCILHFL ALIVARIAFH LNKKHRKIIN
51 TNLQICFPQY TQKERDKLSL KIYENFAQFG IDCLQNQNTT KEKILNKVNF
101 INENFLIDAL ALKRPIIIFTT AHYGNWEILS LAYAAKYGAI SIVGKKLKSE
151 VMYEILSQSR TQFDIELIDK KGGIRQMLSA LKKERALGIL TDQDCVENES
201 VRLKFFNKEV NYQMGASLIA QRSNALIIPV YAYKEGGKFC IEFFAKDSQ
251 NASLEELTLY QAQSCEEMIK KRPWEYFFFH RRFASYNEEI YKGAK
```

SEQ ID NO: 33. Amino acid sequence of glycosyltransferase encoded by ORF 3a of *C. jejuni* OH4384 *LOS* locus.

```
1 MNLKQISVII IVKNAEQTLL ECLNSLKDFD EIILLNNESS DNTLKIANEF
51 KKDFANLYIY HNAFIGFGAL KNLALSYAKN DWILSIDADE VLENECIKEL
101 KNLKLQEDNI IALSRKNLYK GEWIKACGWW PDYVLRIFNK NFTRFNDNLV
151 HESLVLPSNA KKIYLKNGLK HYSYKDISHL IDKMQYYSSL WAKQNIHKKS
201 GVLKANLRAF WTFFRNYFLK NGFLYGYKGF IISVCSALGT FFKYMKLYEL
251 QRQKPKTCAL IIITYNQKER LKLVLDSVKN LAFLPNEVLI ADDGSKEDTA
301 RLIEEYQKDF PCPLKHIWQE DEGFKLSKSR NKTIKNADSE YIIVIDGDMI
351 LEKDFIKEHL EFAQRKLFLQ GSRVILNKKE SEEILNKDDY RIIFNKKDFK
401 SSKNSFLAKI FYSLSKKR
```

SEQ ID NO: 34. Amino acid sequence of glycosyltransferase encoded by ORF 4a of *C. jejuni* OH4384 *LOS* locus.

```
1 MKKIGVVIPI YNVEKYLREC LDSVINQTYT NLEIILVNDG STDEHSLNIA
 51 KEYTLKDKRI TLFDKKNGL SSARNIGIEY FSGEYKLKNK TQHIKENSЛИ
101 EFQLDGNNPY NIYKAYKSSQ AFNNEKDLTN FTYPSIDYII FLDSDNYWKL
151 NCIEECVIRM KNVDVLWFDH DCTYEDNIKN KHKKTRMEIF DFKKECIITP
201 KEYANRALSV GSRDISFGWN GMIDFNFLKQ IKLKFINFII NEDIHFGIIL
251 FASANKIYVL SQKLYLCRLR ANSISNHDKK ITKANVSEYF KDIYETFGEN
301 AKEAKNYLKA ASRVITALKL IEFFKDQKNE NALAIKETFL PCYAKKALMI
351 KKFKKDPLNL KEQLVLIKPF IQTKL PYDIW KFWQKIKNI
```

SEQ ID NO: 35. Amino acid sequence of sialic acid synthase encoded by ORF 8a of *C. jejuni* OH4384 *LOS* locus.

```
1 MKEIKIQNII ISEEKAPLVV PEIGINHNG SLELAKIMVD AAFSTGAKII
 51 KHQTHIVEDE MSKAAKKVIP GNAKISIYEI MQKCALDYKD ELALKEYTEK
101 LGLVYLSTPF SRAGANRLED MGVSASFKIGS GECNNYPLIK HIAAFKKPMI
151 VSTGMNSIES IKPTVKILLD NEIPFVLMHT TNLYPTPHNL VRLNAMLELK
201 KEFSCMVGLS DHTTDNLACL GAVALGACVL ERHFTDSMHR SGPDIVCSMD
251 TQALKELIIQ SEQMAIMRGN NESKKAQKQE QVTIDFAFAS VVSIKDIKKG
301 EVLSMDNIWV KRPGLGGISA AEFENILGKK ALRDIEENDTQ LSYEDFA
```

SEQ ID NO: 36. Amino acid sequence of enzyme involved in sialic acid biosynthesis encoded by ORF 9a of *C. jejuni* OH4384 *LOS* locus.

```
1 MYRVQNSSEF ELYIFATGMH LSKNFGYTVK ELYKNGFKNI YEFINYDKYF
 51 STDKALATTI DGFSRYVNEL KPDLIVVHGD RIEPLAAAIV GALNNILVAH
101 IEGGEISGTI DDSLRHAISK LAHIHLVND EFAKRRLMQLG EDEKSIFIIG
151 SPDLELLNDN KISLNEAKKY YDINYENYAL LMFHPVTTEI TSIKNQADNL
201 VKALIQSNKN YIVIYPNNDL GFELILQSYE ELKNNPRFKL FPSLRFEYFI
251 TLLKNADFII GNSSCILKEA LYLKTAGILV GSRQNGRLGN ENTLKVNANS
301 DEILKAINTI HKKQDLFSAK LEILDSSKLF FEYLQSGEFF KLNTQKVFKD
351 IK
```

SEQ ID NO: 37. Amino acid sequence of CMP-sialic acid synthetase encoded by ORF 10a of *C. jejuni* OH4384 *LOS* locus.

```
1 MSLAIIPARG GSKGIKKNL VLLNNKPLIY YTIIKAALNTK SISKVVVSSD
 51 SDEILNYAKS QNVDILKRPI SLAQDNTTSD KVLLHALKFY KDYEDVVFLQ
101 PTSPLRTNIH IDEAFNLYKN SNANALISVS ECDNKILKAF VCNEYGDLAG
151 ICNDEYPPFMP RQKLPKTYMS NGAIYIILKIK EFLNNPSFLQ SKTKHFLMDE
201 SSSLDIDCLE DLKKAEQIWK K
```

SEQ ID NO: 38. Amino acid sequence of acetyltransferase encoded by ORF 11a of *C. jejuni* OH4384 *LOS* locus.

```
1 MEKITLKCNK NILNLLKQYN IYTKTYIENP RRFSRLKTKD FITFPLENNQ
 51 LESVAGLGIE EYCAFKFSNI LHEMDSFSFS GSFLPHYTKV GRYCSISDGV
```

101 SMFNFQHPMD RISTASFTYE TNHSFINDAC QNHINKTFPI VNHNPPSSIT  
151 HLIIIQDDVWI GKDVLLKQGI TLGTGCVIGQ RAVVTKDVPP YAIVAGIPAK  
201 IIKYRFDEKT IERLLKIQWW KYHFADFYDI DLNLKINQYL DLLEEKIIKK  
251 SISYYNPNKL YFRDILELKS KKIFNLF

SEQ ID NO: 39. Amino acid sequence of glycosyltransferase encoded by ORF 12a of *C. jejuni* OH4384 *LOS* locus.

1 MPQLSIIIPF FNSCDFISRA LQSCINQTLK DIEILIIIDDK SKDNSLNMVL  
51 EFAKKDPRIK IFQNEENLGT FASRN LGVLH SSSDFIMFLD SDDFLTPDAC  
101 EIAFKEMKKG FDLLCFDAFV HRVTKQFYR FKQDEVFNQK EFLEFLSKQR  
151 HFCWSVWAKC FKKDIILKSF EKIKIDERLN YGEDVLFCYI YFMFCEKIAV  
201 FKTCIYHYEF NPNGRYENKN KEILNQNYHD KKKSNEIIKK LSKEFAHDEF  
251 HQKLFEVLKR EEAGVKNRLK